

# Aswinkumar Varathakumaran

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## Profile

Senior undergraduate focused on computer vision, generative modeling, and multimodal AI, with research experience in real-time perception systems, foundation model adaptation, and applied deep learning for high-impact visual understanding tasks.

## Education

<b>Vellore Institute of Technology</b> <i>B.Tech in Computer Science with AI/ML Specialization</i> — <i>CGPA: 8.96</i>	2022 – Present Chennai, India
<b>Delhi Public School</b> <i>CBSE XII</i> — <i>94.4%</i>	2021 – 2022 Bangalore, India

## Experience

<b>Undergraduate Machine Learning TA</b> 📄 PI: Dr. Sajidha S A — VIT Chennai	July 2024 – Dec 2024
<ul style="list-style-type: none"><li>Assisted final year ML students with machine learning assignments, tutorials, and guided project workflows for hands-on learning.</li></ul>	
<b>Deffo Tech AI</b> AIML Intern	Dec 2025 – Current
<ul style="list-style-type: none"><li>Working on India's first fully indigenous Large Language Model developed under the TamilAI project.</li></ul>	

## Publications

- Varathakumaran, A., & Paramanandham, N.** *Depth-Aware Instance Segmentation for Accurate Pothole Depth Estimation Using Monocular Depth Maps for Advanced Driver Assistance.* **International Journal of Pavement Engineering (IJPE).** (Under Review) 📄 Code 📄 Paper
- Varathakumaran, A., & Paramanandham, N.** *ProvRain: Rain-Adaptive Denoising and Vehicle Detection via MobileNet-UNet and Faster R-CNN.* **ICSINTESA 2025.** (Accepted) 📄 Code 📄 Paper
- Varathakumaran, A., Jawahara, A., Mynampati, S.A., Sajidha, & Thaseen, S.** *PROXI-NAV: Proximity-Aware Navigation with Audio-Visual Sensing Intelligence.* **FTNCT'08.** (Under Review) 📄 Code 📄 Paper
- Varathakumaran, A., Jawahar, A., & Pandiyaraju, V.** *CLAIMS: Clinical Labeling and Abnormality Inference from Multilead ECG using LLMs with Evidence Citation.* **ICACRS 2025.** (Under Review) 📄 Code 📄 Paper

## Projects

<b>Basketball Player Tracking with Court Projection</b> 📄 (YOLOv11, Streamlit, Docker, FastAPI)	June 2025
<ul style="list-style-type: none"><li>Developed a complete sports analytics pipeline using YOLOv11 trained on custom DeepSportRadar court and player annotations, enabling robust multi-player tracking under dynamic lighting and motion.</li><li>Computed homography transformations to map broadcast-view detections onto a top-down court representation, enabling zone-based heatmaps, possession analytics, and trajectory inference.</li><li>Built a Dockerized Streamlit-FastAPI deployment supporting live video ingestion, asynchronous inference, and real-time overlay rendering with sub-80ms latency per frame.</li></ul>	
<b>Space Agriculture Data Portal</b> 📄 (NASA OSDR API, LangChain, Ollama, Streamlit)	Feb 2025
<ul style="list-style-type: none"><li>Engineered a data exploration portal for NASA's Open Science Data Repository (OSDR), automating dataset retrieval, metadata parsing, preprocessing, and time-series visualization of microgravity plant-growth experiments.</li><li>Integrated an LLM-powered query engine using LangChain + Ollama, enabling scientific question-answering grounded in experiment metadata, controlled vocabulary, and mission logs.</li><li>Designed an interactive dashboard with modular visualizations (growth curves, environmental parameters, genotype comparisons) to support hypothesis formation for space agriculture research workflows.</li></ul>	

## Achievements

- Program Representative for **Computer Science AI&ML branch** at *VIT Chennai*.
- Top **10 Finalist** at *Hack The Horizon 2.0* — VIT Chennai AI Club's flagship *24-hour hackathon* with **200+** participants from South India.
- Top **5 Finalist** in *Cosmonova*, a space-based research hackathon hosted by **SEDS Antariksh**.

## Extracurriculars

- **Treasurer & Marketing Lead, Socrates Club - VIT** Aug 2023 – Present  
*Managed club finances, sponsorship acquisition, budgeting for events, directed promotional strategies, designed materials, and enhanced campus visibility.*
- **Sophrosyne VIT, Toastmasters International** July 2024  
*Was part of the newsletter editorial team and organized public speaking workshops for 80+ participants.*
- **Internshala Student Program (ISP) 2025** Mar 2025  
*Represented Internshala, promoting internships, trainings, and student engagement.*
- **Marina Beach Cleanup** May 2024  
*Co-led 3 km cleanup with 15+ volunteers.*
- **American Football Team — VIT Chennai** June 2023 – April 2024  
*Vice Captain, led a 15-member team to semi finals in a state level tournament.*

## Certifications

- Oracle Cloud Infrastructure 2025 Generative AI Professional — **Oracle University** June 2025
- Neural Networks and Deep Learning — **DeepLearning.AI** Aug 2025
- Forge Industry Certification – Accenture Nordics — **Forage** May 2024

## Technical Skills

- **Languages:** Python, C/C++, Java, SQL, HTML/CSS, JavaScript
- **Frameworks:** PyTorch, TensorFlow, Streamlit, React, Next.js
- **Developer Tools:** Git, VSCode, CVAT, Roboflow, Docker
- **Libraries:** OpenCV, MediaPipe, HF Transformers, LangChain, pandas, NumPy
- **Vision Models:** YOLO, Detectron2, SAM, HRNet, MiDaS, ZoeDepth
- **Core:** Keypoints, Segmentation, Homography, Depth Estimation, Video Inference
- **NLP:** NER, Sentiment Analysis, Speech-to-Text, Text Generation
- **APIs & Data:** HF API, NASA OSDR API, REST APIs, SQLite3, MySQL